Debtors' Ex. 116

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Estimating the Impact on Potential Output of Structural Reforms to Increase the Female Participation Rate

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Abstract

This paper estimates the impact of structural reforms aimed at increasing the female participation rate on potential output in Malta. Albeit starting from a low level, the female participation rate in Malta increased by 11.7 percentage points between 2008 and 2014, by far the highest increase registered among EU countries. Females accounted for almost all the increase in full-time employment between 2008 and 2014 and to around two-thirds of the increase in part-time employment. The trend increase in participation is estimated to have contributed, on average, to 0.8 percentage points per annum to potential output between 2008 and 2014. The headline increase in the female participation rate is adjusted to account for changing demographics and the education attainment of the workforce. The median of the various estimates presented in this note – based on an aggregate approach and a cohort model of labour participation – suggests that slightly less than half of the headline increase in the female participation rate is attributable to reforms. Overall, the impact of the various reforms is calculated to have raised the economy's potential output growth by 0.3 percentage points per annum since 2008.

2

Table of Contents

3

Executive Summary

This paper estimates the impact of structural reforms aimed at increasing the female participation rate on potential output in Malta. Albeit starting from a low level, the female participation rate in Malta increased by 11.7 percentage points between 2008 and 2014, by far the highest increase registered among EU countries. In addition to outlining the key reforms enacted to attract more females in the labour market, the paper focuses on three broad themes:

What is the contribution of females to job creation in Malta since 2008 and what sectors have benefitted the most?

According to the Labour Force Survey, employment increased by 19,800 between 2008 and 2014, mostly due to females. Females accounted for almost all the increase in full-time employment and to around two-thirds of the increase in part-time employment. Slightly more than half of the new full-time jobs for females were created in public administration, education, healthcare & social work activities, while for part-timers, around 40% were created in wholesale & retail trade and the tourism industry.

How much has the increase in participation contributed to potential GDP?

Using a production function approach – in which potential GDP is assumed to depend on capital, labour and total factor productivity – the trend increase in participation is estimated to have contributed, on average, to 0.8 percentage points per annum to potential output between 2008 and 2014.

What is the impact of structural reforms on potential GDP?

The headline increase in the female participation rate is adjusted to account for changing demographics and the educational attainment of the workforce. The median of the various estimates presented in this note – based on an aggregate approach and a cohort model of labour participation – suggests that slightly less than half of the 11.7 percentage point increase in the female participation rate could be attributable to reforms. Overall, the impact of the various reforms is calculated to have raised the economy's potential output growth by 0.3 percentage points per annum since 2008.

4

1. Introduction

Structural reforms are policies that permanently and positively affect the supply-side of the economy. These reforms increase the economy's potential output – the amount of output that can be sustainably produced without leading to distortions in factor markets – by raising the inputs to production, such as the supply or quality of labour or capital, or by ensuring that these inputs are used more efficiently. They also increase the resilience of an economy to adjust to shocks and facilitate the reallocation of resources within and across sectors.[2]

Estimates by the European Commission suggest that Malta is one of the EU countries that would benefit the most from enacting labour market reforms. According to a recent study, a reform package covering both the product and labour market in which Malta would half the gap vis-à-vis the three best performing EU countries would entail increases in GDP of 7.6% relative to its no-reform baseline over a period of ten years, with the greatest gains being associated with skill enhancing reforms that raise the share of low-skilled workers and efforts to increase the participation rate of females and older workers.[3] Similarly, estimates presented in the National Reform Programme for 2015 suggest that the various active labour market measures are expected to raise GDP and employment by 2.8% and 4.6%, respectively, by 2020 relative to 2014.[4]

In recent years, the Maltese government implemented a number of reforms to address the objectives of the Europe 2020 Strategy, including those targeted to increase the participation rate of females in the labour market. These reforms have started to bear fruit. Between 2008 and 2014, the female participation rate in Malta increased by 11.7 percentage points, by far the highest increase registered among EU countries (see chart 1). Despite this improvement, however, the female participation rate, at 52.1% in 2014, still remains one of the lowest in the EU and hence, there is ample room for further catching-up in the future.

Against this background, this note estimates the impact of structural reforms to increase the participation rate of females on the economy's supply potential. To do so, we first calculate the potential output of the Maltese economy using a production function approach, which decomposes potential output into the effects of labour, capital and total factor productivity (TFP). The labour component is further decomposed into the effects of the working-age population, the trend participation rate and the structural unemployment rate. The impact of reforms is calculated by adjusting the increase in the participation rate using two different approaches. The first one is based on an aggregate approach, where adjustments are made
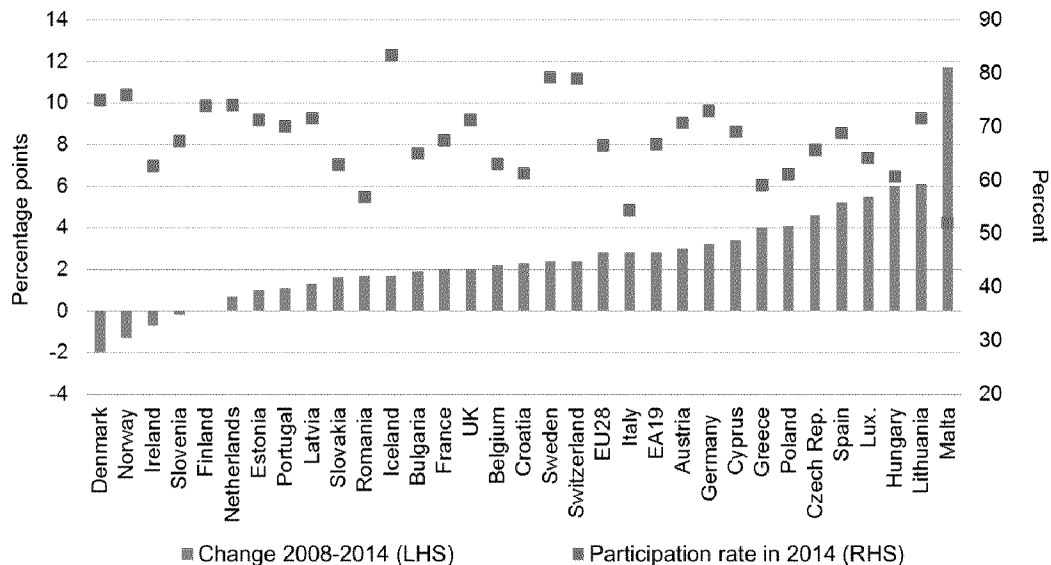
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[2] Draghi (2015).
[3] Varga and in't Veld (2014).
[4] Ministry of Finance (2005). The estimates are based on QUEST III with research and development, a dynamic stochastic general equilibrium (DSGE) model developed by the European Commission that was specifically adapted to the Maltese economy.

5

to account for both the decline in the working-age population and the trend increase in the female labour supply. The second method is based on a cohort model of labour participation to focus on the importance of compositional changes in the female participation rate, both in terms of demographics and educational attainment.

Chart 1
Female participation rate in EU countries

Source: Eurostat

The main conclusions are the following. According to the production function approach, the trend increase in participation is estimated to have contributed, on average, to 0.8 percentage points per annum to potential output between 2008 and 2014. The median estimate of the various approaches suggests that slightly less than half of the 11.7 percentage point increase in the female participation rate between 2008 and 2014 is attributable to labour market reforms. Overall, the impact of the various reforms to increase the female participation rate is calculated to have raised the economy's potential output growth by 0.3 percentage points per annum over the past 6 years.

The rest of this paper is structured as follows. Section 2 describes the main developments in female employment and the structural reforms to increase the participation rate of females since 2008. Section 3 estimates the supply-side of the Maltese economy using a production function approach while Section 4 adjusts the headline increase in the participation rate using both an aggregate approach and a cohort-based model. Section 5 combines the findings of the previous two sections to calculate the impact of potential output.

6

2. Developments in female employment and reforms since 2008

The Maltese labour market was very resilient after the crisis, with Malta registering one of the highest growth rates in employment among the EU countries.[5] According to the Labour Force Survey, employment increased by 19,800 between 2008 and 2014, mostly due to females (see Table 1). The increase in job creation was broadly split between full and part-timers. Females accounted for almost all the increase in full-time employment and to around two-thirds of the increase in part-time employment. In terms of full-time employment, slightly more than half of the new jobs for females were created in public administration, education, healthcare & social work activities. This is also associated with the structural changes that occurred in the Maltese economy, with activities previously conducted informally by housekeepers now being serviced by the formal economy, such as residential care.[6] Another 17% of full-time employment for women was created in professional, technical, administrative and support services activities. Around 40% of new part-time jobs for females were created in wholesale & retail trade and the tourism industry, with another 20% in arts, entertainment and recreational activities.

Table 1
Employment decomposition by Gender and Job Contract

	1000s	%
Difference in employment between 2008 and 2014	19,800	12.6
Males	3,500	3.3
Females	16,200	30.7
Due to full-time	9,900	7.1
Males	300	0.3
Females	9,600	24.3
Due to part-time	9,800	56.0
Males	3,200	74.4
Females	6,600	50.0

Source: Eurostat

The increase in female employment was facilitated by a number of government initiatives aimed at increasing the participation rate of women in the labour market.[7] Measures include

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[5] Micallef (2013)
[6] Grech (2015b)
[7] The increase in female participation is even more striking when seen from a long-term perspective. Grech (2015a) ascribes this to the transformation in the role of women in society, with rising education levels combined

7

back-to-work fiscal incentives for women, new income tax computations, an increase in maternity and adoption leave, tax credits for self-employed and exemptions of means-testing for income earned by women working part-time. Self-employed women working on a part time basis, as in the case of employed persons, were given the opportunity to choose to pay a 15% pro rata contribution on their income.

Childcare facilities were made more available and affordable. A number of public child care centres were introduced and their operational hours extended until 1600hrs to be more effective for working parents. After-school care services were also introduced in a number of schools to bridge the gap between day school and regular working hours of parents in employment.[8] Other initiatives were targeted to provide care for children before schools' official opening hours to allow additional flexibility to working parents.[9]

In conjunction with the above initiatives, a number of measures were aimed to further improve basic skills attainment and reduce early school leavers, both of which intended to strengthen the employability prospects of people joining the labour market.

3. Estimating the supply-side side

The impact of changes in the participation rate on potential output is calculated using a production function to model the supply-side of the Maltese economy for the period 1980-2014. The production function relates output to the level of technology and factor inputs, namely labour and capital, by means of a constant-returns-to-scale Cobb-Douglas specification, namely:

$$Y_t = TFP_t \ K_t^{\alpha} \ L_t^{1-\alpha}$$

where Y_t denotes output at time t, L_t the labour input, K_t the capital stock and TFP_t the total factor productivity.[10] TFP is derived as the HP-filter of the Solow residual, using the standard smoothing parameter of 100 for annual data. The Solow residual is that part of economic growth that cannot be explained through growth in the capital stock or in the labour supply

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with changing social norms. Using a historical database, the author documents that the increase in female participation observed in the last decade is higher than that witnessed in the previous three decades.

[8] The 'Klabb 3-16' has been in operation since 2009 and provides after-school service to children whose parents are in employment. This service operates throughout the scholastic year and school holidays, including summer. As at 2014, the Klabb 3-16 service was offered from 31 schools.

[9] The Breakfast Club is intended to provide care for children attending public schools before the schools' official opening hours, from 07.30 will 08.30. This initiative is open to every primary public school in Malta and Gozo.

[10] The share of labour income is calibrated at 0.55 based on the share of compensation of employees in gross value added (GVA) adjusted for the proportion of the labour force that consists of self-employed.

8

and is a proxy for productivity gains. In the absence of official statistics, the stock of capital is calculated using the perpetual inventory method.[11]
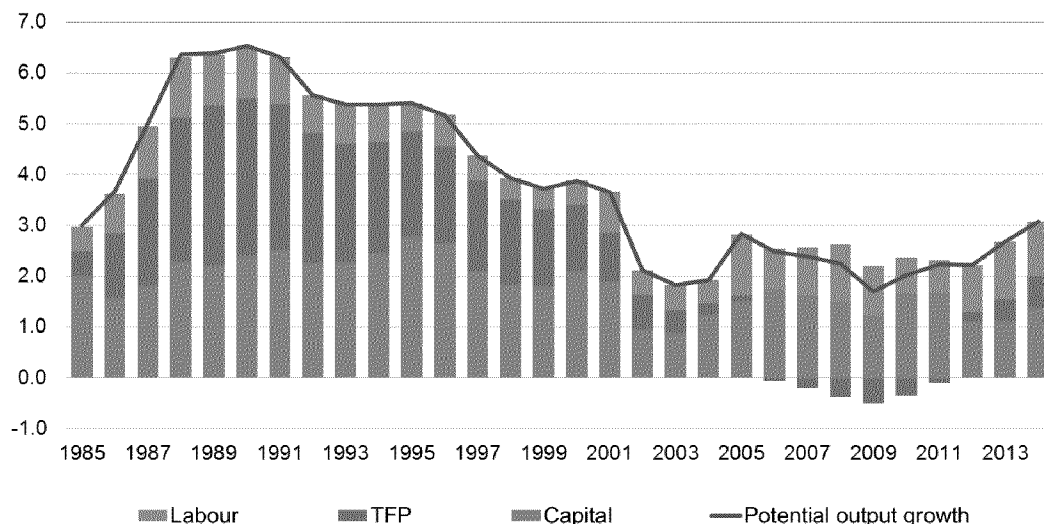
The trend labour supply can be further decomposed as follows:

$$L_t = WAP_t \ \overline{PR_t} \ (1 - \overline{UNR_t})$$

where WAP_t denotes the working-age population, $\overline{PR_t}$ the trend participation rate and $\overline{UNR_t}$ the structural unemployment rate or NAIRU. To help derive potential labour utilisation, the trend participation rate and NAIRU are obtained using the HP filter.

Chart 2 plots the contribution of labour, capital and TFP to potential output growth between 1985 and 2014. The chart points to substantial changes in potential output growth during this period, with a trend decline in potential output in the 2000s compared to the growth rates registered in the 1980s and 1990s. The slowdown in early 2000s is attributable to both demand and supply side elements, with the cyclical upswing between 2005 and 2008 being interrupted by the Great Recession of 2009.[12] However, contrary to the experience in other countries, potential output in Malta has recovered after the crisis and has even exceeded the pre-crisis peak, standing at around 3.1% in 2014.

Chart 2
Potential output growth in Malta
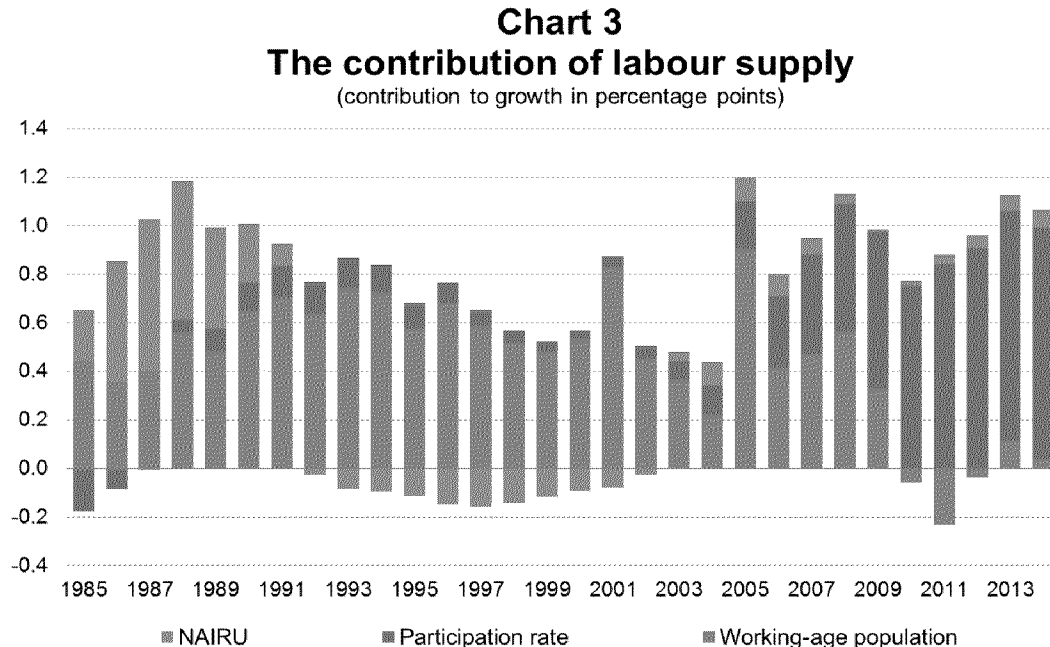(annual growth rate; contributions to potential growth)

Source: Author's calculations

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[11] The perpetual inventory method is based on the following formula: $K_t = (1 - \delta)K_{t-1} + I_t$, where K_t is level of the capital stock, I_t is real investment and δ represents the depreciation rate. Housing investment is excluded from the measurement of capital stock. The capital stock thus includes both public investment and non-housing investment by the private sector.

[12] See Grech and Micallef (2014) for a detailed description of the main developments in Malta's potential output.

9

Chart 3 decomposes the contribution of labour to potential output growth. In the years before the recession, the increase in the working-age population was the main driver of the trend labour supply. Since 2009, however, the unfavourable effects of an ageing population started to weigh in, with a gradual decline in the contribution of the working-age population. These effects have been outweighed by the rising participation rate, which has contributed, on average, 0.8 percentage points per annum to potential output growth between 2008 and 2014. This was mainly driven by the increase in the female participation rate, which went up by 11.7 percentage points since 2008, by far the largest increase among EU countries, though it still remains relatively low at 52.1% in 2014. Albeit to a much lesser extent, developments in NAIRU have also contributed positively to potential output growth after the crisis as the increase in the unemployment rate during the recession proved to be temporary and has since declined to near historical lows.[13]

Chart 3
The contribution of labour supply
(contribution to growth in percentage points)

Source: Author's calculations

4. Adjustments to the participation rate

While it is undeniable that structural reforms played an important role in raising the female participation rate in recent years, the increase masks the effects of factors unrelated to reforms. After all, in addition to government policy, the labour force participation of women is determined, to a large extent, by the level of female education, the overall labour market conditions and cultural attitudes.

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[13] Micallef (2014)

10

In the case of Malta, the decline in the working-age population and changes in the structure of the labour force could also have exerted an impact on the participation rate. This section therefore tries to identify the effects of reforms by adjusting the increase in the participation rate using two different approaches.[14] The first one is based on an aggregate approach, where adjustments are made to account for both the decline in the working-age population and the trend increase in the female labour supply. The second method is based on a cohort model of labour participation to focus on the importance of compositional changes in the female participation rate, both in terms of demographics and educational attainment.
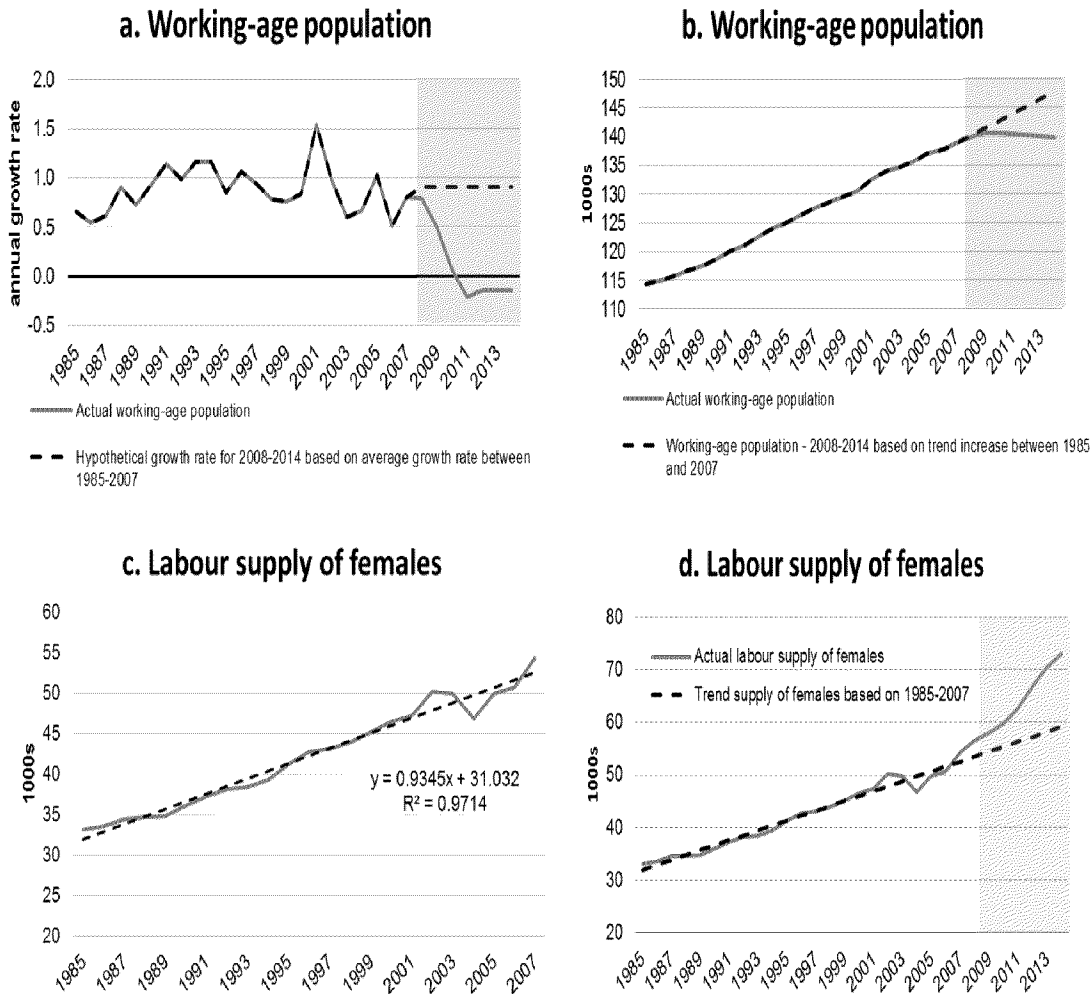
Method 1 – Aggregate approach

Besides the reforms, there are at least two factors that could have impacted positively the female participation rate in Malta in recent years:

- *Decline in the working-age population*: with the participation rate defined as the ratio of the labour force to the working-age population, a decline in the denominator would automatically increase the participation rate.

- *Changes in the structure of the labour force*: the decision to join the labour force is determined by a number of factors in addition to government policy. For instance, women finishing tertiary education will join the labour force irrespective of government incentives to attract more women back in employment.

Charts 4a and 4b plots the evolution of the working-age population from a long-term perspective, both in annual growth rates and thousands of persons, from the mid-1980s till 2014. The impact of an ageing population kicked-in around 2008, with a sharp decline in the growth rate of the working-age population.

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[14] A common approach to study the impact of reforms is to use difference-in-differences (DID) estimator. This approach is used to identify the impact of policy changes where only part of the population is affected by the change in policy. The population is divided in two categories, the treatment group that are affected by policy and the control group which remain unaffected. The key identifying assumption behind this approach is that trends for both the treatment and control groups would have been the same in the absence of a change in policy. See Card and Krueger (1994) for a seminal study applying DID. An application of DID for Malta is particularly challenging. Identifying an appropriate control group is difficult as a number of initiatives targeted women in all age brackets while the reforms were staggered over a number of years. An application using DID to estimate the impact of reforms on the female participation rate will be left for future research.

11

Chart 4

a. Working-age population

Actual working-age population

– – Hypothetical growth rate for 2008-2014 based on average growth rate between 1985-2007

b. Working-age population

Actual working-age population

– – Working-age population - 2008-2014 based on trend increase between 1985 and 2007

c. Labour supply of females

$y = 0.9345x + 31.032$
$R^2 = 0.9714$

d. Labour supply of females

Actual labour supply of females

– – Trend supply of females based on 1985-2007

Source: Eurostat and author's calculations

The demographic challenge could bias upward the impact of reforms on the participation rate. To adjust for this effect, we assume that between 2008 and 2014, the working-age population increased by 0.9% per annum, its average growth over the period 1985-2007. According to this assumption, the working-age population of females would have increased to around 148,000 in 2014 instead of 139,800.

Turning to the labour supply, chart 4c plots the increase in the labour supply of females between 1985 and 2007, together with a fitted linear trend. This trend is extended over the period 2008-2014 in chart 4d to proxy the trend increase in the females' labour supply that would have occurred irrespective of the labour market reforms. Chart 4d clearly shows that the increase in female labour supply since 2008 has by far outpaced the fitted trend line.

12

Adjusting for these two effects would lower the female participation rate by 3.3 percentage points in 2014, from 52.1% to 48.9%. This means that, according to this approach, out of the 11.7 percentage point increase in the female participation rate since 2008, around one-fourth could not be explained by the decline in the working-age population and the natural increases in the labour supply of females and hence, could be attributable to labour market reforms.

Method 2 – Cohort model of labour force participation

The second approach is based on a cohort model of labour force participation. The female participation rate can be decomposed into the weighted sum of the participation rate of different demographic groups:

$$PR_t = \sum_i s_t^i PR_t^i$$

where PR_t^i is the participation rate of group i, s_t^i is the population share of group i (i.e. $s_t^i \equiv \frac{Pop_t^i}{Pop_t}$) and Pop_t^i is the population of group i.
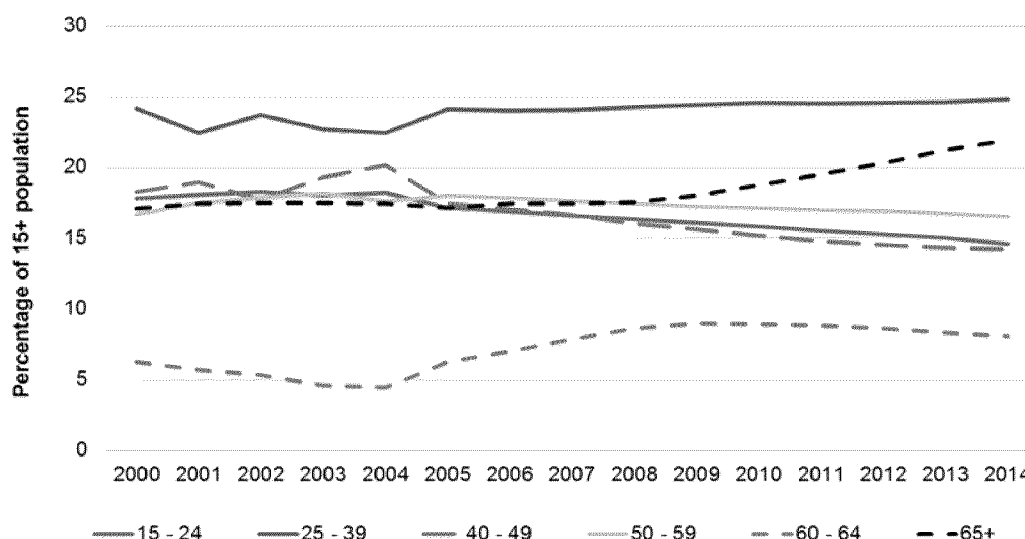
Over the past decade, there were changes in both the demographic composition of the female population and the participation rates by age bracket. The population share of the 25-39 age category has remained broadly unchanged over the past decade at around 25% of the population aged 15 and above (see chart 5a). The shares of the 15-24, 40-49 and 50-59 brackets have declined, with the drop being mostly pronounced for the first two categories, dropping from around 18% in 2000 to 14% in 2014. On the contrary, the share of older persons has increased, especially for the 65+ category. The latter category has seen its share rising from 17% in 2000 to 22% in 2014, with the increase being especially pronounced from around 2008-09.

There were also notable changes in the participation rate of different age groups (see chart 5b). Increases were registered in the participation rate of the 25-49, 50-59 and 60-64 age groups while the participation rate of teenagers and young adults has been declining. The latter trend, which is also observed in EU countries, is due to more young people opting to pursue further their studies.

There are also differences in the female participation rate between Malta and the EU by age bracket and education attainment (see charts 6 and 7). In particular, Malta's participation rate in the 15-24 age bracket, at 51.7% in 2014, is 12.8 percentage points higher than the
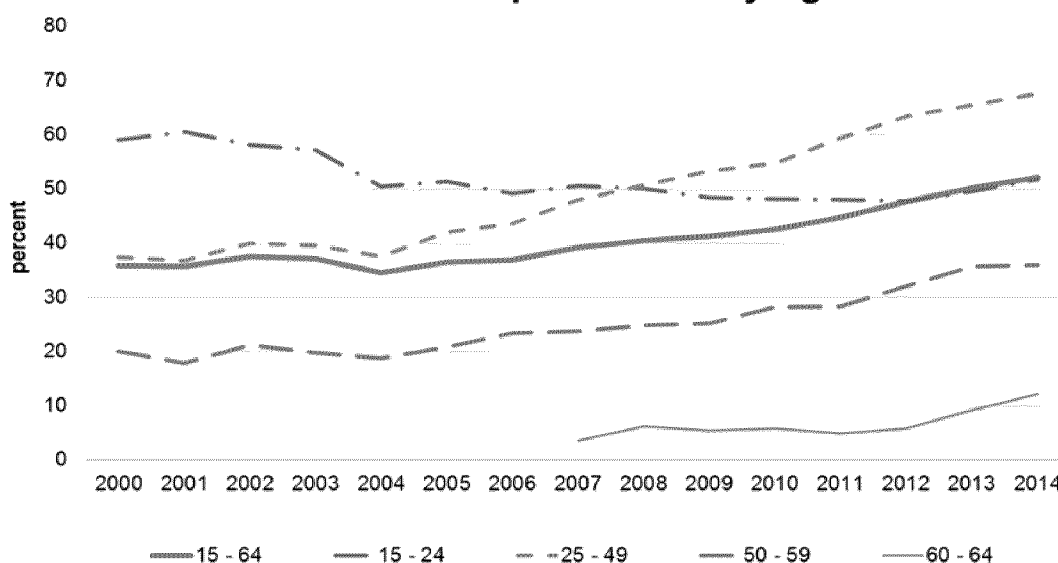
13

EU average. On the contrary, the participation rate in the other three categories – 25-49, 50-59 and 60-64 – is lower in Malta, with the differences between the two economies being especially pronounced in the 50+ age brackets. In terms of educational attainment, most of the differences are concentrated in the lowest education category, which covers primary and lower secondary. Indeed, within the 25-49 age bracket, the female participation rate in Malta in the medium and high education category is higher than the EU average.
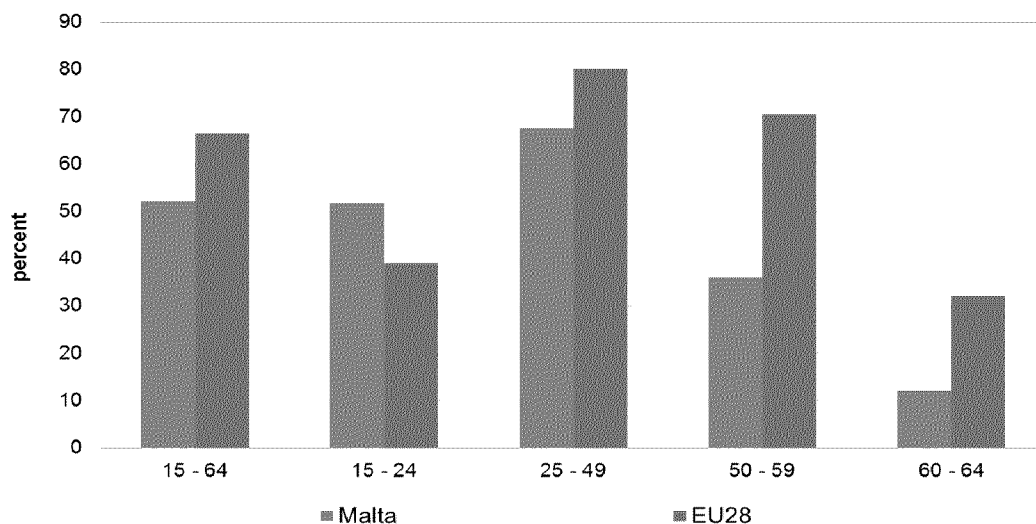
Chart 5a
Female Population Shares by Age

Source: Eurostat
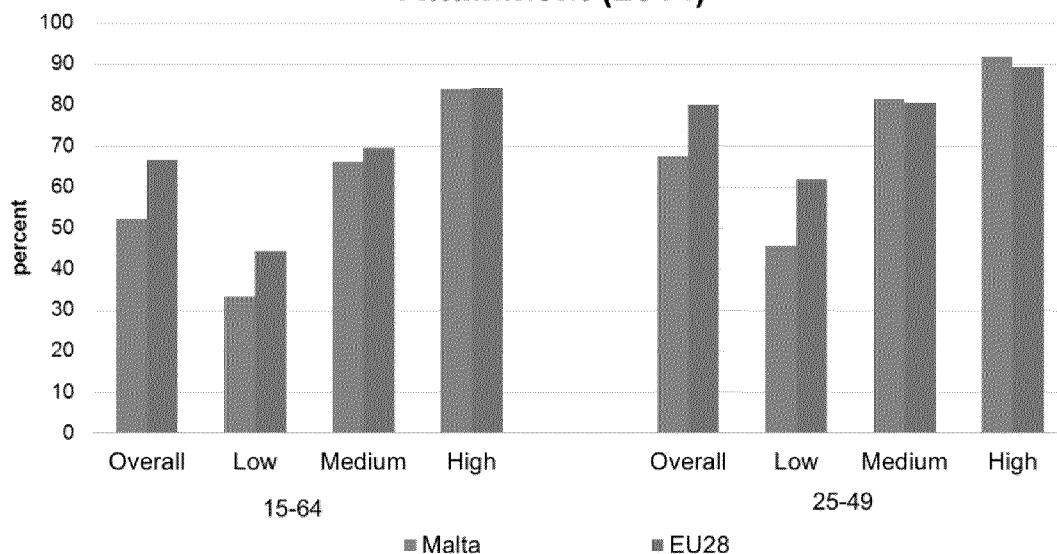
Chart 5b
Female Participation Rate by Age

Source: Eurostat

14

Chart 6
Female Participation Rate by Age Bracket (2014)

Source: Eurostat

Chart 7
Female Participation Rate by Age and Education
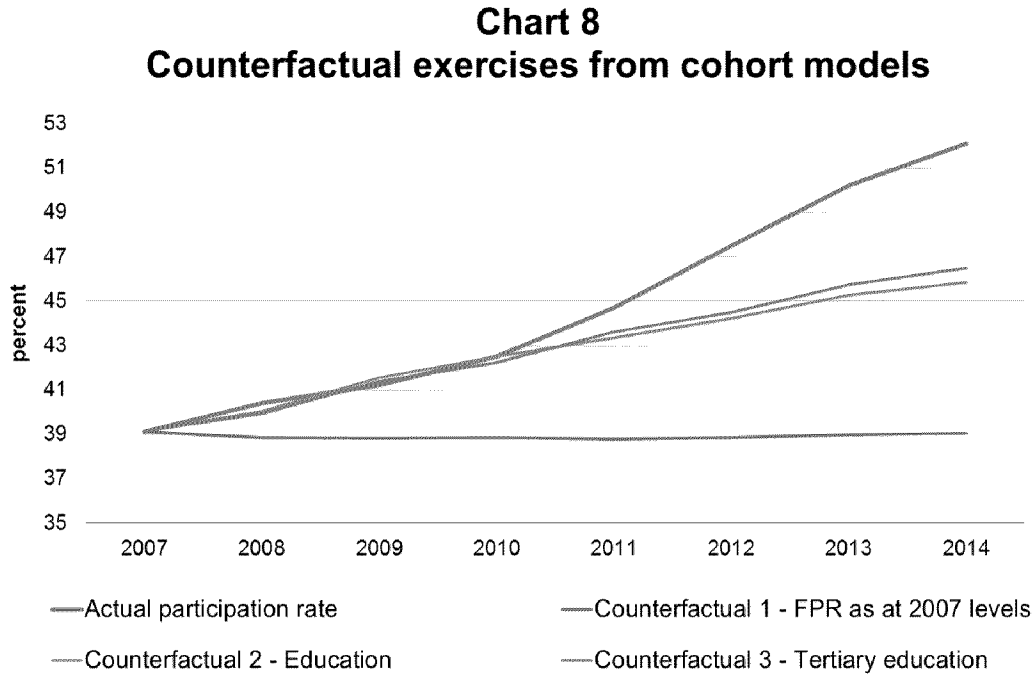**Attainment (2014)**

Source: Eurostat

To understand the importance of changes in the labour force participation rates of different demographic and educational groups, we present three different counterfactual exercises.[15] In the first exercise, we keep the female participation fixed at its 2007 level and allow the demographic composition of the population to follow its actual path. The second exercise

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[15] A similar exercise is presented in Kudlyak (2013).

15

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keeps the participation rate for the three different education categories unchanged at their 2007 levels and allows the demographic composition by education levels to follow their actual path. In the third simulation, we fix the female participation rate for the low and medium education at the 2007 levels and allow both the demographic composition by education and the participation rate of those with a tertiary level of education to follow their actual paths. The results of these counterfactual exercises are shown in chart 8.

Chart 8
Counterfactual exercises from cohort models

Source: Author's calculations

The simulations point to different results. The hypothetical participation rate from the first exercise (which kept the participation rate fixed at 2007 levels) remained broadly unchanged since the decline in some age brackets were offset by increases in the older category, while the share of the largest age bracket, those aged between 25 and 39 in chart 5a, has remained broadly unchanged. On the contrary, the other two simulations point to increases in the participation rate due to an increase in the share of the population with medium and high level of education and a corresponding drop of those with only a primary or lower secondary education. However, the latter two exercises are not enough to explain the increase in the female participation rate observed since 2008: the impact of a higher level of education raises the hypothetical participation rate to 46% - 47% by 2014, around 6 percentage points lower than the actual participation rate of 52.1%. Moreover, the gap between the actual and hypothetical participation rate started to increase from 2011
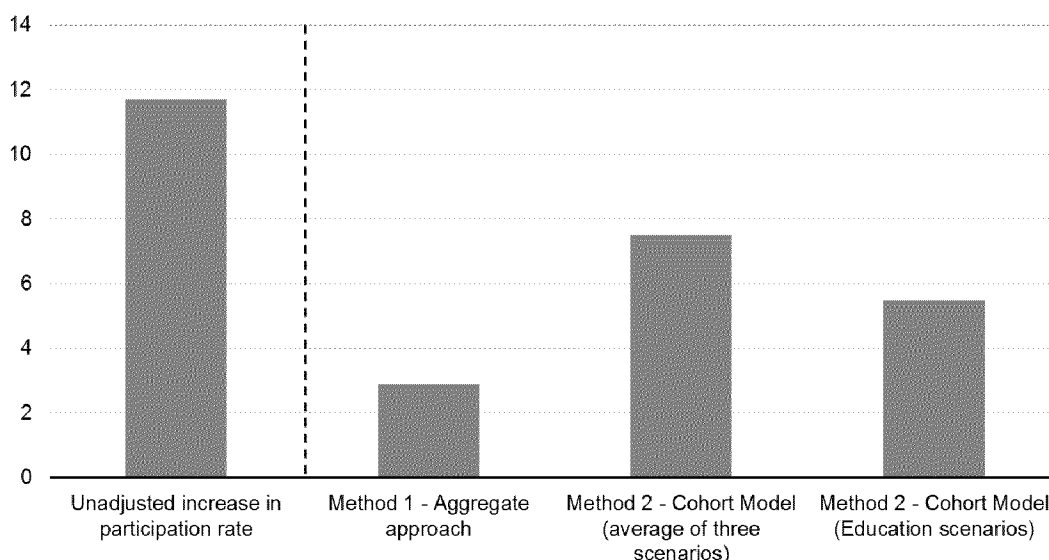
16

suggesting that, on their own, demographic and education changes in the female population are not enough to explain the sharp increase in the female participation rate.

5. Impact of reforms

The exercises in the previous section points to a positive impact of labour market reforms on the female participation rate in recent years. Calculating the precise impact of reforms, however, is challenging and surrounded by a degree of uncertainty since different methods provide different estimates. The fact that the reforms consist of various measures that were introduced gradually over a number of years makes this task even more difficult.

Chart 9 compares the various approaches outlined in this paper with the unadjusted participation rate, which increased by 11.2 percentage points between 2008 and 2014. The first approach adjusts both the labour supply and the working-age population to account for the trend increase in the female participation rate in the labour market that is unrelated to reforms and the ageing population. According to this approach, the increase in the participation rate due to reforms amounted to around 3 percentage points since 2008. The second approach was based on a cohort model of the participation rate that accounted to changes in both the demographic composition and the education attainment of the female population.   According to these models, the impact of reforms on the participation rate since 2008 stood between 5.5 and 7.5 percentage points.

Chart 9
Impact of reforms on female participation rate
(percentage point difference between 2008 and 2014)

Source: Author's calculations

17

Table 2 summarizes the main results. Taking the median of the three approaches in chart 9, slightly less than half of the 11.7 percentage point increase in the female participation rate between 2008 and 2014 is attributable to labour market reforms. The trend increase in participation rate contributed, on average, to 0.8 percentage points per annum to potential output growth between 2008 and 2014. The latter include the effect of both males and females. During this period, females accounted for around 80% of the increase in the labour force. Combining all these effects, the impact of the various labour market reforms to increase the female participation rate is calculated to have raised the economy's potential output growth by 0.3 percentage points per annum over the past 6 years.

Table 2

Estimates of labour market reforms on potential output growth

(percentage points)

Increase in participation rate between 2008 and 2014	11.7
Increase in participation rate between 2008 and 2014 due to reforms (taking the median from the 3 approaches in chart 9)	5.5
Average contribution of participation rate to potential output growth between 2008 and 2014	0.8
Impact on potential output attributable to reforms (47%) and females (80% of labour supply)	0.3

18

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19